

SEQUENCE LISTING

<110> BRAIN BIOTECHNOLOGY RESEARCH AND INFORMATION NETWORK AG
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<120> Expression of nitrile hydratases in a two-vector expression system

<130> 009848-0356699

<140> 10/593,362
 <141> 2006-09-18

<150> PCT/EP2005/001688
 <151> 2005-02-18

<150> DE 10 2004 013 843.5
 <151> 2004-03-20

<160> 34

<170> PatentIn version 3.1

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Lys Gly Leu Val Pro Asp Gly Tyr Val Glu Gly Trp Lys Lys Thr Phe	
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gag gag gac ttc agt cca agg cgc gga gcg gaa ttg gtc gcg cgg gcg	192
Glu Glu Asp Phe Ser Pro Arg Arg Gly Ala Glu Leu Val Ala Arg Ala	
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85 90 95	
gca gtc gaa gac acc ccg acc ctc aag aac gtg atc gtg tgc tcg ctg	336
Ala Val Glu Asp Thr Pro Thr Leu Lys Asn Val Ile Val Cys Ser Leu	
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tgt tca tgc acc gcg tgg ccc att ctc ggc ctg ccc cct acc tgg tac	384
Cys Ser Cys Thr Ala Trp Pro Ile Leu Gly Leu Pro Pro Thr Trp Tyr	
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Leu Phe Glu Met Gly Thr Glu Ile Ala Ser Asp Val Glu Ile Arg Val	
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Tyr Asp Thr Thr Ala Glu Thr Arg Tyr Met Val Leu Pro Gln Arg Pro	
165 170 175	
gca ggc acc gaa ggc tgg agc cag gaa cag ctt cag gag atc gtc acc	576
Ala Gly Thr Glu Gly Trp Ser Gln Glu Gln Leu Gln Glu Ile Val Thr	
180 185 190	
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Ala Val Glu Asp Thr Pro Thr Leu Lys Asn Val Ile Val Cys Ser Leu	
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145 150 155 160	
Tyr Asp Thr Thr Ala Glu Thr Arg Tyr Met Val Leu Pro Gln Arg Pro	
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 Glu His Leu Pro Tyr Ser Leu Met Phe Ala Gly Val Ala Glu Leu Gly
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 Ala Phe Ser Val Asp Glu Val Arg Tyr Val Val Glu Arg Met Glu Pro
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 Ala Thr Leu Met Val Glu Lys Gly Ile Leu Thr Gln Glu Glu Leu Glu
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 Ser Leu Ala Gly Gly Pro Phe Pro Leu Ser Arg Pro Ser Glu Ser Glu
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Arg His Tyr Met Met Thr Pro Tyr Tyr Glu Arg Tyr Val Ile Gly Val
 65 70 75 80

Ala Thr Leu Met Val Glu Lys Gly Ile Leu Thr Gln Glu Glu Leu Glu
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Ser Leu Ala Gly Gly Pro Phe Pro Leu Ser Arg Pro Ser Glu Ser Glu
 100 105 110

Gly Arg Pro Ala Pro Val Glu Thr Thr Thr Phe Glu Ile Gly Gln Arg
 115 120 125

Val Arg Val Arg Asp Glu Tyr Val Pro Gly His Ile Arg Met Pro Ala
 130 135 140

Tyr Cys Arg Gly Arg Val Gly Thr Ile Ser His Arg Thr Thr Glu Lys
 145 150 155 160

Trp Pro Phe Pro Asp Ala Ile Gly His Gly Arg Asn Asp Ala Gly Glu
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 Ala Val Glu Asp Thr Pro Thr Leu Lys Asn Val Ile Val Cys Ser Leu
 100 105 110

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Trp Thr Asp Pro Glu Phe Arg Gln Leu Leu Leu Thr Asp Gly Thr Ala
 65 70 75 80

Ala Val Ala Gln Tyr Gly Tyr Leu Gly Pro Gln Gly Glu Tyr Ile Val
 85 90 95

Ala Val Glu Asp Thr Pro Thr Leu Lys Asn Val Ile Val Cys Ser Leu
 100 105 110

Cys Ser Cys Thr Ala Trp Pro Ile Leu Gly Leu Pro Pro Thr Trp Tyr
 115 120 125

Lys Ser Phe Glu Tyr Arg Ala Arg Val Val Arg Glu Pro Arg Lys Val
 130 135 140

Leu Ser Glu Met Gly Thr Glu Ile Ala Ser Asp Val Glu Ile Arg Val
 145 150 155 160

Tyr Asp Thr Thr Ala Glu Thr Arg Tyr Met Val Leu Pro Gln Arg Pro
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Pro His Thr Val Asn Ala Asp Ile Gly Pro Thr Phe His Ala Glu Trp
                20                               25          30

gaa cac ctg ccg tac agc ctg atg ttc gcc ggt gtc gcc gaa ctc ggg      144
Glu His Leu Pro Tyr Ser Leu Met Phe Ala Gly Val Ala Glu Leu Gly
                35                               40          45

gca ttc agc gtc gac gaa gtt cga tac gtc gtc gag cgg atg gaa cca      192
Ala Phe Ser Val Asp Glu Val Arg Tyr Val Val Glu Arg Met Glu Pro
                50                               55          60

cgc cac tac atg atg acc ccg tac tac gag agg tac gtc atc ggc gtc      240
Arg His Tyr Met Met Thr Pro Tyr Tyr Glu Arg Tyr Val Ile Gly Val
                65                               70          75          80

gcg aca ctg atg gtc gaa aag gga atc ctg acg cag gat gaa ctc gaa      288
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Ser Leu Ala Gly Gly Pro Phe Pro Leu Ser Arg Pro Ser Glu Ser Glu
                100                              105          110

ggg cgt ccg gca ccc gtc gag acg acc acc ttc gaa atc ggt cag cga      384
Gly Arg Pro Ala Pro Val Glu Thr Thr Thr Phe Glu Ile Gly Gln Arg
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gta cgc gtg cgc gac gag tac gtt ccg ggg cat att cga atg cct gcg      432
Val Arg Val Arg Asp Glu Tyr Val Pro Gly His Ile Arg Met Pro Ala
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tac tgc cgc gga cga gtg gga acc atc tct cat cgg act acc gag aag      480
Tyr Cys Arg Gly Arg Val Gly Thr Ile Ser His Arg Thr Thr Glu Lys
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tgg cca ttt ccc gac gca atc ggc cac ggg cgc aac gac gcc ggc gaa      528
Trp Pro Phe Pro Asp Ala Ile Gly His Gly Arg Asn Asp Ala Gly Glu
                165                              170          175

gaa ccg acg tac cac gtg aag ttc gcc gcc gag gaa ttg ttc ggt agc      576
Glu Pro Thr Tyr His Val Lys Phe Ala Ala Glu Glu Leu Phe Gly Ser
                180                              185          190

gac acc gac ggc ggc agc gtc gta gtc gac ctt ttc gag ggt tac ctc      624
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Ala Phe Ser Val Asp Glu Val Arg Tyr Val Val Glu Arg Met Glu Pro
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65     70     75     80
Ala Thr Leu Met Val Glu Lys Gly Ile Leu Thr Gln Asp Glu Leu Glu
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Ser Leu Ala Gly Gly Pro Phe Pro Leu Ser Arg Pro Ser Glu Ser Glu
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Gly Arg Pro Ala Pro Val Glu Thr Thr Thr Phe Glu Ile Gly Gln Arg
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Val Arg Val Arg Asp Glu Tyr Val Pro Gly His Ile Arg Met Pro Ala
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Tyr Cys Arg Gly Arg Val Gly Thr Ile Ser His Arg Thr Thr Glu Lys
145    150    155    160
Trp Pro Phe Pro Asp Ala Ile Gly His Gly Arg Asn Asp Ala Gly Glu
165    170    175
Glu Pro Thr Tyr His Val Lys Phe Ala Ala Glu Glu Leu Phe Gly Ser
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Asp Thr Asp Gly Gly Ser Val Val Val Asp Leu Phe Glu Gly Tyr Leu
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Ala Pro Val Ser Asp Arg Ala Trp Ala Leu Phe Arg Ala Leu Asp Gly	
20 25 30	
aag gga ttg gta ccc gac ggt tac gtc gag gga tgg aag aag acc ttc	144
Lys Gly Leu Val Pro Asp Gly Tyr Val Glu Gly Trp Lys Lys Thr Phe	
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Glu Glu Asp Phe Ser Pro Arg Arg Gly Ala Glu Leu Val Ala Arg Ala	
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tgg acc gac ccc gag ttc cgg cag ttg ctt ctc acc gac ggt acc gcc	240
Trp Thr Asp Pro Glu Phe Arg Gln Leu Leu Leu Thr Asp Gly Thr Ala	
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Ala Val Ala Gln Tyr Gly Tyr Leu Gly Pro Gln Gly Glu Tyr Ile Val	
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gca gtc gaa gac acc ccg acc ctc aag aac gtg atc gtg tgc tcg ttg	336
Ala Val Glu Asp Thr Pro Thr Leu Lys Asn Val Ile Val Cys Ser Leu	
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tgt tca tgc acc gcg tgg ccc att ctc ggc ctg ccc cct acc tgg tac	384
Cys Ser Cys Thr Ala Trp Pro Ile Leu Gly Leu Pro Pro Thr Trp Tyr	
115 120 125	
aag agt ttc gaa tac cgt gcg cga gtg gtg cgt gag cca cgg aag gtt	432
Lys Ser Phe Glu Tyr Arg Ala Arg Val Val Arg Glu Pro Arg Lys Val	
130 135 140	
ctc tcc gag atg gga acc gag atc gcg tcg gac gtc gag atc cgc gtc	480
Leu Ser Glu Met Gly Thr Glu Ile Ala Ser Asp Val Glu Ile Arg Val	
145 150 155 160	
tac gac acc acc gcc gaa act cgc tac atg gtt ctc ccg caa cgt ccc	528
Tyr Asp Thr Thr Ala Glu Thr Arg Tyr Met Val Leu Pro Gln Arg Pro	
165 170 175	
gca ggc acc gaa ggc tgg agc cag gaa cag ctt caa gag atc gtc acc	576
Ala Gly Thr Glu Gly Trp Ser Gln Glu Gln Leu Gln Glu Ile Val Thr	
180 185 190	
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Trp Thr Asp Pro Glu Phe Arg Gln Leu Leu Leu Thr Asp Gly Thr Ala
 65 70 75 80

Ala Val Ala Gln Tyr Gly Tyr Leu Gly Pro Gln Gly Glu Tyr Ile Val
 85 90 95

Ala Val Glu Asp Thr Pro Thr Leu Lys Asn Val Ile Val Cys Ser Leu
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Cys Ser Cys Thr Ala Trp Pro Ile Leu Gly Leu Pro Pro Thr Trp Tyr
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Lys Ser Phe Glu Tyr Arg Ala Arg Val Val Arg Glu Pro Arg Lys Val
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Leu Ser Glu Met Gly Thr Glu Ile Ala Ser Asp Val Glu Ile Arg Val
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Tyr Asp Thr Thr Ala Glu Thr Arg Tyr Met Val Leu Pro Gln Arg Pro
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ccg cat acc gtc aac gcc gac atc ggc ccc acc ttc cac gcc gag tgg      96
Pro His Thr Val Asn Ala Asp Ile Gly Pro Thr Phe His Ala Glu Trp
                               20                               25          30

gaa cac ctg ccg tac agc ctg atg ttc gcc ggt gtc gcc gaa ctc ggg      144
Glu His Leu Pro Tyr Ser Leu Met Phe Ala Gly Val Ala Glu Leu Gly
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gca ttc agc gtc gac gaa gtt cga tac gtc gtc gag cgg atg gaa cca      192
Ala Phe Ser Val Asp Glu Val Arg Tyr Val Val Glu Arg Met Glu Pro
                               50                               55          60

cgc cac tac atg atg acc ccg tac tac gag agg tac gtc atc ggc gtc      240
Arg His Tyr Met Met Thr Pro Tyr Tyr Glu Arg Tyr Val Ile Gly Val
65                               70                               75          80

gcg aca ctg atg gtc gaa aag gga atc ctg acg cag gaa gaa ctc gaa      288
Ala Thr Leu Met Val Glu Lys Gly Ile Leu Thr Gln Glu Glu Leu Glu
                               85                               90          95

agc ctt gca ggg gga ccg ttc cca ctg tcg cgg cca agc gaa tcc gaa      336
Ser Leu Ala Gly Gly Pro Phe Pro Leu Ser Arg Pro Ser Glu Ser Glu
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ggg cgt ccg gca ccc gtc gag acg acc acc ttc gaa gtc ggt cag cga      384
Gly Arg Pro Ala Pro Val Glu Thr Thr Thr Phe Glu Val Gly Gln Arg
                               115                              120          125

gta cgc gtg cgc gac gag tac gtt ccg ggg cat att cga atg cct gcg      432
Val Arg Val Arg Asp Glu Tyr Val Pro Gly His Ile Arg Met Pro Ala
130                              135                              140

tac tgc cgc gga cga gtg gga acc atc tct cat cgg act acc gag aag      480
Tyr Cys Arg Gly Arg Val Gly Thr Ile Ser His Arg Thr Thr Glu Lys
145                              150                              155          160

tgg cca ttt ccc gac gca atc ggc cac ggg cgc aac gac gcc ggc gaa      528
Trp Pro Phe Pro Asp Ala Ile Gly His Gly Arg Asn Asp Ala Gly Glu
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gaa ccg acg tac cac gtg aag ttc gac gcc gag gaa ttg ttc ggt agc      576
Glu Pro Thr Tyr His Val Lys Phe Asp Ala Glu Glu Leu Phe Gly Ser
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gac acc gac ggc ggc agc gtc gta gtc gac ctt ttc gag ggt tac ctc      624
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Ala Phe Ser Val Asp Glu Val Arg Tyr Val Val Glu Arg Met Glu Pro
 50 55 60

Arg His Tyr Met Met Thr Pro Tyr Tyr Glu Arg Tyr Val Ile Gly Val
 65 70 75 80

Ala Thr Leu Met Val Glu Lys Gly Ile Leu Thr Gln Glu Glu Leu Glu
 85 90 95

Ser Leu Ala Gly Gly Pro Phe Pro Leu Ser Arg Pro Ser Glu Ser Glu
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Gly Arg Pro Ala Pro Val Glu Thr Thr Thr Phe Glu Val Gly Gln Arg
 115 120 125

Val Arg Val Arg Asp Glu Tyr Val Pro Gly His Ile Arg Met Pro Ala
 130 135 140

Tyr Cys Arg Gly Arg Val Gly Thr Ile Ser His Arg Thr Thr Glu Lys
 145 150 155 160

Trp Pro Phe Pro Asp Ala Ile Gly His Gly Arg Asn Asp Ala Gly Glu
 165 170 175

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Ala Ile Glu Thr Leu Leu Tyr Glu Arg Gly Leu Ile Thr Pro Ala Ala	
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gtc gac cga gtc gtt tcg tac tac gag aac gag atc ggc ccg atg ggc	144
Val Asp Arg Val Val Ser Tyr Tyr Glu Asn Glu Ile Gly Pro Met Gly	
35 40 45	
ggg gcc aag gtc gtg gcg aag tcc tgg gtg gac cct gag tac cgc aag	192
Gly Ala Lys Val Val Ala Lys Ser Trp Val Asp Pro Glu Tyr Arg Lys	
50 55 60	
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Trp Leu Glu Glu Asp Ala Thr Ala Ala Met Ala Ser Leu Gly Tyr Ala	
65 70 75 80	
ggg gag cag gca cac caa att tcg gcg gtc ttc aac gac tcc caa acg	288
Gly Glu Gln Ala His Gln Ile Ser Ala Val Phe Asn Asp Ser Gln Thr	
85 90 95	
cat cac gtg gtg gtg tgc act ctg tgt tcg tgc tat ccg tgg ccg gtg	336
His His Val Val Val Cys Thr Leu Cys Ser Cys Tyr Pro Trp Pro Val	
100 105 110	
ctt ggt ctc ccg ccc gcc tgg tac aag agc atg gag tac ccg tcc cga	384
Leu Gly Leu Pro Pro Ala Trp Tyr Lys Ser Met Glu Tyr Arg Ser Arg	
115 120 125	
gtg gta gcg gac cct cgt gga gtg ctc aag cgc gat ttc ggt ttc gac	432
Val Val Ala Asp Pro Arg Gly Val Leu Lys Arg Asp Phe Gly Phe Asp	
130 135 140	
atc ccc gat gag gtg gag gtc agg gtt tgg gac agc agc tcc gaa atc	480
Ile Pro Asp Glu Val Glu Val Arg Val Trp Asp Ser Ser Ser Glu Ile	
145 150 155 160	
cgc tac atc gtc atc ccg gaa cgg ccg gcc ggc acc gac ggt tgg tcc	528
Arg Tyr Ile Val Ile Pro Glu Arg Pro Ala Gly Thr Asp Gly Trp Ser	
165 170 175	
gag gac gag ctg gcg aag ctg gtg agt cgg gac tcg atg atc ggt gtc	576
Glu Asp Glu Leu Ala Lys Leu Val Ser Arg Asp Ser Met Ile Gly Val	
180 185 190	
agt aat gcg ctc aca ccc cag gaa gtg atc gta tga	612
Ser Asn Ala Leu Thr Pro Gln Glu Val Ile Val	
195 200	

<210> 14
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 <212> PRT
 <213> Rhodococcus erythropolis

<400> 14

Val Ser Glu His Val Asn Lys Tyr Thr Glu Tyr Glu Ala Arg Thr Lys
 1 5 10 15

Ala Ile Glu Thr Leu Leu Tyr Glu Arg Gly Leu Ile Thr Pro Ala Ala
 20 25 30

Val Asp Arg Val Val Ser Tyr Tyr Glu Asn Glu Ile Gly Pro Met Gly
 35 40 45

Gly Ala Lys Val Val Ala Lys Ser Trp Val Asp Pro Glu Tyr Arg Lys
 50 55 60

Trp Leu Glu Glu Asp Ala Thr Ala Ala Met Ala Ser Leu Gly Tyr Ala
 65 70 75 80

Gly Glu Gln Ala His Gln Ile Ser Ala Val Phe Asn Asp Ser Gln Thr
 85 90 95

His His Val Val Val Cys Thr Leu Cys Ser Cys Tyr Pro Trp Pro Val
 100 105 110

Leu Gly Leu Pro Pro Ala Trp Tyr Lys Ser Met Glu Tyr Arg Ser Arg
 115 120 125

Val Val Ala Asp Pro Arg Gly Val Leu Lys Arg Asp Phe Gly Phe Asp
 130 135 140

Ile Pro Asp Glu Val Glu Val Arg Val Trp Asp Ser Ser Ser Glu Ile
 145 150 155 160

Arg Tyr Ile Val Ile Pro Glu Arg Pro Ala Gly Thr Asp Gly Trp Ser
 165 170 175

Glu Asp Glu Leu Ala Lys Leu Val Ser Arg Asp Ser Met Ile Gly Val
 180 185 190

Ser Asn Ala Leu Thr Pro Gln Glu Val Ile Val
 195 200

<210> 15
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 <213> Rhodococcus erythropolis

<220>
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 <222> (1)..(690)

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Met Asp Gly Ile His Asp Thr Gly Gly Met Thr Gly Tyr Gly Pro Val
1                               5                               10          15

ccc tat cag aag gac gag ccc ttc ttc cac tac gag tgg gag ggt cgg      96
Pro Tyr Gln Lys Asp Glu Pro Phe Phe His Tyr Glu Trp Glu Gly Arg
                20                25                30

acc ctg tcg att ctg acc tgg atg cat ctc aag ggc atg tcg tgg tgg      144
Thr Leu Ser Ile Leu Thr Trp Met His Leu Lys Gly Met Ser Trp Trp
                35                40                45

gac aag tcg cgg ttc ttc cgg gag tcg atg ggg aac gaa aac tac gtc      192
Asp Lys Ser Arg Phe Phe Arg Glu Ser Met Gly Asn Glu Asn Tyr Val
                50                55                60

aac gag att cgc aac tcg tac tac acc cac tgg ctg agt gcg gca gaa      240
Asn Glu Ile Arg Asn Ser Tyr Tyr Thr His Trp Leu Ser Ala Ala Glu
65                70                75                80

cgt atc ctc gtc gcc gac aag atc atc acc gaa gaa gag cga aag cac      288
Arg Ile Leu Val Ala Asp Lys Ile Ile Thr Glu Glu Glu Arg Lys His
                85                90                95

cgt gtg cag gag atc ctc gag ggt cgg tac acg gac agg aac ccg tcg      336
Arg Val Gln Glu Ile Leu Glu Gly Arg Tyr Thr Asp Arg Asn Pro Ser
                100                105                110

cgg aag ttc gat ccg gcc gag atc gag aag gcg atc gaa cgg ctt cac      384
Arg Lys Phe Asp Pro Ala Glu Ile Glu Lys Ala Ile Glu Arg Leu His
                115                120                125

gag ccc cac tcc cta gca ctt cca gga gcg gag ccg agt ttc tcc ctc      432
Glu Pro His Ser Leu Ala Leu Pro Gly Ala Glu Pro Ser Phe Ser Leu
                130                135                140

ggt gac aag gtc aaa gtg aag aat atg aac ccg ctg gga cac aca cgg      480
Gly Asp Lys Val Lys Val Lys Asn Met Asn Pro Leu Gly His Thr Arg
145                150                155                160

tgc ccg aaa tat gtg cgg aac aag atc ggg gaa atc gtc acc tcc cac      528
Cys Pro Lys Tyr Val Arg Asn Lys Ile Gly Glu Ile Val Thr Ser His
                165                170                175

ggc tgc cag atc tat ccc gag agc agc tcc gcc ggc ctc ggc gac gat      576
Gly Cys Gln Ile Tyr Pro Glu Ser Ser Ser Ala Gly Leu Gly Asp Asp
                180                185                190

ccc cgc ccg ctc tac acg gtc gcg ttt tcc gcc cag gaa ctg tgg ggc      624
Pro Arg Pro Leu Tyr Thr Val Ala Phe Ser Ala Gln Glu Leu Trp Gly
                195                200                205

gac gac gga aac ggg aaa gac gta gtg tgc gtc gat ctc tgg gaa ccg      672
Asp Asp Gly Asn Gly Lys Asp Val Val Cys Val Asp Leu Trp Glu Pro
210                215                220

tac ctg atc tct gcg tga
Tyr Leu Ile Ser Ala
225

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<210> 16
 <211> 229
 <212> PRT
 <213> Rhodococcus erythropolis

<400> 16

Met Asp Gly Ile His Asp Thr Gly Gly Met Thr Gly Tyr Gly Pro Val
 1 5 10 15

Pro Tyr Gln Lys Asp Glu Pro Phe Phe His Tyr Glu Trp Glu Gly Arg
 20 25 30

Thr Leu Ser Ile Leu Thr Trp Met His Leu Lys Gly Met Ser Trp Trp
 35 40 45

Asp Lys Ser Arg Phe Phe Arg Glu Ser Met Gly Asn Glu Asn Tyr Val
 50 55 60

Asn Glu Ile Arg Asn Ser Tyr Tyr Thr His Trp Leu Ser Ala Ala Glu
 65 70 75 80

Arg Ile Leu Val Ala Asp Lys Ile Ile Thr Glu Glu Glu Arg Lys His
 85 90 95

Arg Val Gln Glu Ile Leu Glu Gly Arg Tyr Thr Asp Arg Asn Pro Ser
 100 105 110

Arg Lys Phe Asp Pro Ala Glu Ile Glu Lys Ala Ile Glu Arg Leu His
 115 120 125

Glu Pro His Ser Leu Ala Leu Pro Gly Ala Glu Pro Ser Phe Ser Leu
 130 135 140

Gly Asp Lys Val Lys Val Lys Asn Met Asn Pro Leu Gly His Thr Arg
 145 150 155 160

Cys Pro Lys Tyr Val Arg Asn Lys Ile Gly Glu Ile Val Thr Ser His
 165 170 175

Gly Cys Gln Ile Tyr Pro Glu Ser Ser Ser Ala Gly Leu Gly Asp Asp
 180 185 190

Pro Arg Pro Leu Tyr Thr Val Ala Phe Ser Ala Gln Glu Leu Trp Gly
 195 200 205

Asp Asp Gly Asn Gly Lys Asp Val Val Cys Val Asp Leu Trp Glu Pro
 210 215 220

Tyr Leu Ile Ser Ala
 225

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 <400> 23
 cgcggatcca agaaggagat atacatg 27

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 <400> 24
 ccgcaacggtt caaacggtct gg 22

<210> 25
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 <400> 25
 aggaatacgc atatgagcga gcacgtc 27

<210> 26
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 <212> DNA
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 <220>
 <223> Primer

 <400> 26
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 <223> Primer

 <400> 27
 aggaatgagc atatggatgg tatccacgac a 31

<210> 28
 <211> 33
 <212> DNA
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 <220>
 <223> Primer

 <400> 28
 atcgggatcc tttcacgcag agatcaggta cgg 33

<210> 29
 <211> 35
 <212> DNA
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 <220>
 <223> Primer

 <400> 29
 ctcaggatcc aaggagtgat cgtatgagtg aagac 35

<210> 30
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 <400> 30
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<210> 31
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 <212> DNA
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 Met Ser Glu Asp Thr Leu Thr Asp Arg Leu Pro Ala Thr Gly Thr Ala
 1 5 10 15

 gca ccg ccc cgc gac aat ggc gag ctt gta ttc acc gag cct tgg gaa 96
 Ala Pro Pro Arg Asp Asn Gly Glu Leu Val Phe Thr Glu Pro Trp Glu
 20 25 30

 gca acg gca ttc ggg gtc gcc atc gcg ctt tcg gat cag aag tcg tac 144
 Ala Thr Ala Phe Gly Val Ala Ile Ala Leu Ser Asp Gln Lys Ser Tyr
 35 40 45

 gaa tgg gag ttc ttc cga cag cgt ctc att cac tcc atc gct gag gcc 192
 Glu Trp Glu Phe Phe Arg Gln Arg Leu Ile His Ser Ile Ala Glu Ala
 50 55 60

 aac ggt tgc gag gca tac tac gag agc tgg aca aag gcg ctc gag gcc 240
 Asn Gly Cys Glu Ala Tyr Tyr Glu Ser Trp Thr Lys Ala Leu Glu Ala
 65 70 75 80

 agc gtg gtc gac tcg ggg ctg atc agc gaa gat gag atc cgc gag cgc 288
 Ser Val Val Asp Ser Gly Leu Ile Ser Glu Asp Glu Ile Arg Glu Arg
 85 90 95

 atg gaa tcg atg gcc atc atc gac tga 315
 Met Glu Ser Met Ala Ile Ile Asp
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<210> 32
 <211> 104
 <212> PRT
 <213> Rhodococcus erythropolis

<400> 32

Met Ser Glu Asp Thr Leu Thr Asp Arg Leu Pro Ala Thr Gly Thr Ala
 1 5 10 15

Ala Pro Pro Arg Asp Asn Gly Glu Leu Val Phe Thr Glu Pro Trp Glu
 20 25 30

Ala Thr Ala Phe Gly Val Ala Ile Ala Leu Ser Asp Gln Lys Ser Tyr
 35 40 45

Glu Trp Glu Phe Phe Arg Gln Arg Leu Ile His Ser Ile Ala Glu Ala
 50 55 60

Asn Gly Cys Glu Ala Tyr Tyr Glu Ser Trp Thr Lys Ala Leu Glu Ala
 65 70 75 80

Ser Val Val Asp Ser Gly Leu Ile Ser Glu Asp Glu Ile Arg Glu Arg
 85 90 95

Met Glu Ser Met Ala Ile Ile Asp
 100

<210> 33
 <211> 1200
 <212> DNA
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<220>
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 <222> (1)..(1200)

<400> 33

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 Met Val Asp Thr Arg Leu Pro Val Thr Val Leu Ser Gly Phe Leu Gly
 1 5 10 15

gcc ggg aag acg aca cta ctc aac gag atc ctg cga aat cga gag ggt 96
 Ala Gly Lys Thr Thr Leu Leu Asn Glu Ile Leu Arg Asn Arg Glu Gly
 20 25 30

cgg cgg gtc gcg gtg atc gtc aac gac atg agc gaa atc aac atc gac 144
 Arg Arg Val Ala Val Ile Val Asn Asp Met Ser Glu Ile Asn Ile Asp
 35 40 45

agt gca gaa gtc gag cgt gag atc tcg ctc agt cgc tcc gag gag aaa 192
 Ser Ala Glu Val Glu Arg Glu Ile Ser Leu Ser Arg Ser Glu Glu Lys
 50 55 60

ctg gtc gag atg acc aac ggc tgc atc tgc tgc act ctg cga gag gat 240
 Leu Val Glu Met Thr Asn Gly Cys Ile Cys Cys Thr Leu Arg Glu Asp
 65 70 75 80

ctt ctt tcc gag atc agc gcc ttg gcc gcc gat ggc cga ttc gac tac 288
 Leu Leu Ser Glu Ile Ser Ala Leu Ala Ala Asp Gly Arg Phe Asp Tyr
 85 90 95

cta Leu	ctc Leu	atc Ile	gaa Glu 100	tct Ser	tcg Ser	ggc Gly	atc Ile	tcc Ser 105	gaa Glu	ccg Pro	ctt Leu	ccc Pro	gtc Val 110	gca Ala	gag Glu	336
acg Thr	ttc Phe	aca Thr 115	ttc Phe	atc Ile	gat Asp	acc Thr	gac Asp 120	ggc Gly	cac His	gcc Ala	ctc Leu	gcc Ala 125	gac Asp	gtc Val	gcc Ala	384
cga Arg	ctc Leu 130	gac Asp	acc Thr	atg Met	gtc Val	acc Thr 135	gtc Val	gtc Val	gac Asp	ggc Gly	cac His 140	agt Ser	ttt Phe	ctg Leu	cgc Arg	432
gac Asp 145	tac Tyr	acg Thr	gct Ala	ggg Gly	ggc Gly 150	cgc Arg	gtc Val	gaa Glu	gcc Ala	gat Asp 155	gcc Ala	ccg Pro	gaa Glu	gac Asp	gaa Glu 160	480
cga Arg	gac Asp	atc Ile	gcg Ala	gat Asp 165	ctg Leu	ctt Leu	gtc Val	gat Asp 170	cag Gln	atc Ile	gaa Glu	ttt Phe	gcc Ala	gac Asp 175	gtc Val	528
atc Ile	ctg Leu	gtg Val	agc Ser 180	aag Lys	gcc Ala	gat Asp	ctc Leu	gtc Val 185	tcg Ser	cac His	cag Gln	cac His	ctg Leu 190	gtc Val	gaa Glu	576
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atg Met	acg Thr 210	ctc Leu	ggt Gly	cgc Arg	atc Ile	cca Pro 215	ctc Leu	gac Asp	acg Thr	att Ile	ctc Leu 220	gac Asp	acc Thr	ggt Gly	ttg Leu	672
ttc Phe 225	tcg Ser	ctc Leu	gaa Glu	aag Lys	gct Ala 230	gca Ala	cag Gln	gcc Ala	ccc Pro	gga Gly 235	tgg Trp	tta Leu	caa Gln	gaa Glu	ctc Leu 240	720
caa Gln	ggt Gly	gaa Glu	cac His	atc Ile 245	ccc Pro	gaa Glu	acc Thr	gaa Glu	gag Glu 250	tac Tyr	gga Gly	atc Ile	agt Ser	tcg Ser 255	gtg Val	768
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gac Asp	aag Lys	tgg Trp	gaa Glu 340	gaa Glu	ccc Pro	gtc Val	gga Gly	gac Asp 345	tgc Cys	cga Arg	caa Gln	gaa Glu	ctc Leu 350	gtc Val	ttc Phe	1056
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tgt Cys	cta Leu 370	ctc Leu	acc Thr	aca Thr	gcc Ala	gag Glu 375	atc Ile	gaa Glu	ctc Leu	ggg Gly	cca Pro 380	gac Asp	gtg Val	tgg Trp	acc Thr	1152

acc tgg agc gac ccc ctg ggc gtc ggc tat acc gac cag acc gtt tga 1200
 Thr Trp Ser Asp Pro Leu Gly Val Gly Tyr Thr Asp Gln Thr Val
 385 390 395

<210> 34
 <211> 399
 <212> PRT
 <213> Rhodococcus erythropolis

<400> 34

Met Val Asp Thr Arg Leu Pro Val Thr Val Leu Ser Gly Phe Leu Gly
 1 5 10 15

Ala Gly Lys Thr Thr Leu Leu Asn Glu Ile Leu Arg Asn Arg Glu Gly
 20 25 30

Arg Arg Val Ala Val Ile Val Asn Asp Met Ser Glu Ile Asn Ile Asp
 35 40 45

Ser Ala Glu Val Glu Arg Glu Ile Ser Leu Ser Arg Ser Glu Glu Lys
 50 55 60

Leu Val Glu Met Thr Asn Gly Cys Ile Cys Cys Thr Leu Arg Glu Asp
 65 70 75 80

Leu Leu Ser Glu Ile Ser Ala Leu Ala Ala Asp Gly Arg Phe Asp Tyr
 85 90 95

Leu Leu Ile Glu Ser Ser Gly Ile Ser Glu Pro Leu Pro Val Ala Glu
 100 105 110

Thr Phe Thr Phe Ile Asp Thr Asp Gly His Ala Leu Ala Asp Val Ala
 115 120 125

Arg Leu Asp Thr Met Val Thr Val Val Asp Gly His Ser Phe Leu Arg
 130 135 140

Asp Tyr Thr Ala Gly Gly Arg Val Glu Ala Asp Ala Pro Glu Asp Glu
 145 150 155 160

Arg Asp Ile Ala Asp Leu Leu Val Asp Gln Ile Glu Phe Ala Asp Val
 165 170 175

Ile Leu Val Ser Lys Ala Asp Leu Val Ser His Gln His Leu Val Glu
 180 185 190

Leu Thr Ala Val Leu Arg Ser Leu Asn Ala Ser Ala Ala Ile Val Pro
 195 200 205

Met Thr Leu Gly Arg Ile Pro Leu Asp Thr Ile Leu Asp Thr Gly Leu
 210 215 220

Phe Ser Leu Glu Lys Ala Ala Gln Ala Pro Gly Trp Leu Gln Glu Leu
 225 230 235 240

Gln Gly Glu His Ile Pro Glu Thr Glu Glu Tyr Gly Ile Ser Ser Val
245 250 255

Val Tyr Arg Glu Arg Ala Pro Phe His Pro Gln Arg Leu His Asp Phe
260 265 270

Leu Ser Ser Glu Trp Thr Asn Gly Lys Leu Leu Arg Ala Lys Gly Tyr
275 280 285

Tyr Trp Asn Ala Gly Arg Phe Thr Glu Ile Gly Ser Ile Ser Gln Ala
290 295 300

Gly His Leu Ile Arg His Gly Tyr Val Gly Arg Trp Trp Lys Phe Leu
305 310 315 320

Pro Arg Asp Glu Trp Pro Ala Asp Asp Tyr Arg Arg Asp Gly Ile Leu
325 330 335

Asp Lys Trp Glu Glu Pro Val Gly Asp Cys Arg Gln Glu Leu Val Phe
340 345 350

Ile Gly Gln Ala Ile Asp Pro Ser Arg Leu His Arg Glu Leu Asp Ala
355 360 365

Cys Leu Leu Thr Thr Ala Glu Ile Glu Leu Gly Pro Asp Val Trp Thr
370 375 380

Thr Trp Ser Asp Pro Leu Gly Val Gly Tyr Thr Asp Gln Thr Val
385 390 395